

CHAPTER 7

EFFICIENCY AND EFFECTIVENESS ANALYSES

7.1 INTRODUCTION

This chapter provides instructions for conducting efficiency and effectiveness analyses (see Appendix K for examples). The focus of these analyses is on demonstrating the efficiency and effectiveness of a budget request by comparing the negative impacts (i.e., costs) to the positive impacts (i.e., benefits). These analyses are used to justify change requests.

Each decision item, base reduction item, supplemental, and budget amendment has an efficiency and effectiveness analysis attached to a Schedule 6. The basic approach presented in this chapter applies to all analyses.

Section 7.2 of this chapter provides an overview of conducting efficiency and effectiveness analyses. Sections 7.3 through 7.7 provide detailed information on the required elements in efficiency and effectiveness analyses. Finally, Section 7.8 identifies some specific cases where a partial analysis may be an option.

7.2 OVERVIEW OF AN EFFICIENCY AND EFFECTIVENESS ANALYSIS

Each efficiency and effectiveness analysis must include five required elements (Exhibit 7-1), and each of these elements must be clearly identified with a separate heading. Beyond including these specific elements, the structure for efficiency and effectiveness analyses is flexible and places the responsibility to present credible and defensible support for each budget request on the department.

The required elements allow the department to:

- Summarize the justification for why a proposed approach is preferred to available alternatives, including the option of making no budgetary change;
- describe a specific problem or opportunity that needs to be addressed;
- propose alternative courses of action consistent with the department's objectives and statutory authority;
- select an analytical technique that is appropriate for the problem or opportunity that is being examined; and
- assess the tradeoffs between the costs and benefits associated with the proposed alternatives (i.e., negative impacts compared to positive impacts).

Although these elements are listed in specific order, the actual process of developing the analysis is interactive and will involve working on several of the elements together.

Exhibit 7-1

Required Elements Checklist for an Efficiency and Effectiveness Analysis

- ☐ **1. Identifying Information/Summary of Request**
 - ☐ department name
 - ☐ request/analysis title
 - ☐ request priority number
 - ☐ summary
 - ☐ description of how performance will be evaluated
- ☐ **2. Problem or Opportunity Definition**
- ☐ **3. Available Alternatives**
 - ☐ description, authority, and link to objectives
- ☐ **4. Analytical Technique**
 - ☐ statement identifying the technique used in the assessment element
- ☐ **5. Assessment of Alternatives**
 - ☐ background information
 - ☐ linking budget expenditures to the full range of outcomes (identify general types of costs benefits and describe in qualitative terms)
 - ☐ application of analytical technique/assumptions and calculations
 - ⇒ comparison of benefits to costs
 - ⇒ cost assumptions and calculations
 - ⇒ benefit assumptions and calculations
 - ☐ other key issues for decision making
 - ☐ omissions, biases, or uncertainties

7.3 COMMON IDENTIFYING INFORMATION/SUMMARY OF REQUEST

The first required element in an efficiency and effectiveness analysis consists of common identifying information and a summary of the request. This element should include five components: department name, request/analysis title, priority number, a summary of the requested alternative, and a description of how performance will be evaluated. The summary of the request should identify the preferred alternative and highlight key points to justify the request. It should be limited to one or two paragraphs. The full background, assessment, and justification for the request should be presented in remaining elements of the analysis. Avoid excessive repetition.

7.4 PROBLEM OR OPPORTUNITY DEFINITION

The second required element in an efficiency and effectiveness analysis is the definition of a problem or opportunity that needs to be addressed. The problem or opportunity should be defined in a way that conveys the significance, scope, magnitude, and timing (onset, frequency, or duration) of the issue. It is important that the definition does not presuppose a solution. For example, rather than defining health care problem as a lack of health services for the indigent population, it may be defined as poor health outcomes for individuals.

One additional component of the problem or opportunity definition that should be included for budget amendments is an explanation of why the request was not submitted with the November 15 request.

7.5 AVAILABLE ALTERNATIVES

The next required element in an efficiency and effectiveness analysis is a description of alternative approaches for addressing the problem or opportunity. Identified alternatives should be feasible options that merit further evaluation. A department is not required to include a specific number of alternatives in its analysis and should not include “straw” alternatives that would not merit thoughtful consideration by the Governor or the Legislature. However, departments are requested to assess more than two alternatives. Departments should examine alternative strategies for addressing a problem, not just an increase or decrease in funding for the requested alternative.

However, all analyses should include at a minimum a recommended option and the option of making no budgetary changes. This illustrates the consequences of not funding the request. For example, if the request is for an additional staff person to process claims, this alternative should be compared to the estimated consequences of not hiring the new person (e.g., estimated increase in backlog of claims).

For each of the identified alternatives, the analysis should:

- Briefly describe the alternative and clearly indicate whether the alternative is “recommended” or “not recommended;”
- demonstrate the department’s authority to implement the alternative, including a specific statutory citation or executive order along with identification of any need for changes in authority; and
- identify specific department objectives and, if applicable, Governor’s priorities that are promoted by the alternative (cross-referenced to the Schedule 1).

7.6 ANALYTICAL TECHNIQUE

The next required element in an efficiency and effectiveness analysis is a simple statement identifying the analytical technique used to assess the tradeoffs associated with identified alternatives. A wide range of analytical techniques is available including multi-criteria analysis, return on investment analysis, benefit-cost analysis, cost-effectiveness analysis, and switch-point analysis. In addition, a number of techniques are available for addressing uncertainty or risk. Exhibit 7-2 describes these analytical techniques, which represent a range of qualitative and quantitative approaches. Appendix J and Appendix K provide examples illustrating the application of these techniques. These methods are included in the instructions because they illustrate some of the preferred analytical techniques used to support public decision making. However, the department may also identify and apply other techniques. For example, many of the requests that relate to keeping pace with caseload growth or inflation (e.g., provider rate increases, cost of living adjustments) may be analyzed more effectively using alternative analytical techniques. Before developing an analysis using an alternative technique, discuss the proposed approach with your OSPB analyst. **In addition, departments must obtain approval from their OSPB analyst prior to using multi-criteria analysis as the exclusive analytical technique for examining a particular change request.**

Exhibit 7-2

Preferred Analytical Techniques

Multi-criteria Analysis. This technique allows an analyst to evaluate the performance of alternatives against multiple decision criteria or objectives. These can be specific policy objectives (i.e., ensure 80 percent of third graders are proficient readers, attract high quality teachers, address needs of learning disabled students), or more general criteria (i.e., distribution of benefits, chance of success, political feasibility, robustness/ flexibility). The alternatives considered are listed on one side of a matrix and selected decision criteria are listed on the other side. The analyst then develops relative scores, in either qualitative or quantitative terms, for how each alternative meets the selected criteria. The criteria can also be weighted to reflect their relative importance.

This approach does not necessarily identify a single "optimal" alternative. Instead, it allows a recommendation to be made based on explicit consideration of the tradeoffs associated with various alternatives. This technique is useful when: 1) many important aspects of a decision cannot be easily quantified or monetized, or 2) multiple stakeholders have various objectives or are affected differently by the alternatives under consideration. This technique is not useful if the same alternative is preferred for all of the criteria. It is essential that the scoring in the analysis has a defensible basis, and significant research, analysis, or consensus building will be required to apply this approach in a credible manner.

Departments must obtain approval from their OSPB analyst prior to using multi-criteria analysis as the exclusive analytical technique for examining a particular change request.

Return on Investment Analysis. This technique is most useful for projects that primarily generate internal benefits to the department, which are ultimately translated into lower costs or costs avoided. For example, an information technology project that primarily improves productivity, but does not add significant new capabilities, may be analyzed using this technique. In this approach, the total costs avoided or savings from a project are

divided by total costs invested (investment) for the project. This analysis should cover a period of time that captures the full stream of lower costs or costs avoided for the useful life of the investment. Many projects generate benefits in addition to lower costs. Therefore, this technique may need to be applied in conjunction with other techniques.

Benefit-cost Analysis. This technique involves identifying the full range of benefits and costs associated with a program or a budget change. To the extent feasible, costs both internal and external to state government should be identified, quantified, and valued. In addition, the full range of benefits should be identified, and, where possible, quantified and valued. The quantification of physical, social, and economic impacts is a key step in describing benefits, and considerable attention should be paid to developing credible estimates of positive impacts per a specific unit (i.e., reduction in the number of forms a start-up business must fill out and an estimate of the number of new start-up businesses affected per year). Valuation of quantified benefits should be undertaken with caution and should not be pursued if it would detract from the defensibility of the analysis.

The comparison of benefits to costs can be used to assess whether net benefits will be generated by an alternative. For example, an analyst may estimate that a new highway will generate net benefits through reduced wait time. This analytical framework can also be used to examine redistribution programs by comparing proposed alternatives for implementing a program or by comparing the proposed alternative to existing programs. For example, the net benefits of a housing program implemented through county agencies may be compared to the net benefits of a housing program implemented centrally through the State. Alternatively, the net benefits of a State-run housing program could be compared to the net benefits of a similar program in the private sector or another state. Of course, the key step in each of these examples is how to fully measure the different costs of the programs and, where feasible, how to quantify and monetize benefits.

If valuation of benefits and costs is not feasible, a **qualitative benefit-cost analysis** may still be a useful way of organizing and presenting information. In this approach, the analyst describes the benefits in qualitative terms (and to the extent possible quantitative terms), and makes a rough assessment of whether the benefits are expected to be much lower, roughly on the same order of magnitude, or significantly greater than costs. Qualitative, quantitative, and monetized results from other locations or at another point in time, combined with expert judgement, may be useful in making such an assessment.

Cost-effectiveness Analysis. This is a variation on benefit-cost analysis in which either the benefits or costs are fixed for the purpose of the analysis. One approach is to assess alternative cost estimates for achieving a fixed level of effectiveness. For example, if statute requires that specific health care benefits be provided to a population, cost-effectiveness analysis could be used to identify the least costly alternatives for providing this fixed level of output (i.e., effectiveness). Alternatively, the analyst could assess the effectiveness that could be achieved for a fixed cost. For example, if federal and state match funds are available to address educational needs, cost-effectiveness analysis can be used to identify the most effective alternative for spending these funds.

This approach may be used to compare the cost-effectiveness among alternatives. It may also be used to compare the cost-effectiveness of the proposed alternative to existing programs in Colorado or in other states. It is important to recognize that this technique is used to illustrate the relative cost-effectiveness of various alternatives and that it does not include an assessment of whether the benefits are justified by the costs.

Switch-point Analysis. This is a variation on benefit-cost analysis in which benefits and costs are valued to the extent possible, then an

estimate is made of what the non-monetized benefits and costs would have to be for benefits to equal costs. Based on this analysis, the possibility of benefits exceeding (or being substantially less than) costs may be assessed. For example, if a new management process for licensing individuals is estimated to cost \$10,000 annually, result in \$5,000 in costs avoided (through efficiencies), and reduce wait times for the individuals served, a switch-point analysis can be applied. Using this technique, an analyst would determine that the benefit of the reduced wait time would have to plausibly be equal to or greater than \$5,000 for the project to generate net benefits.

Approaches for Evaluating Uncertainty and Risk. If an alternative involves an important component of uncertainty or risk, the analysis should include an evaluation of this component. There are several approaches that may be used in conjunction with the "core" technique used for the analysis.

1. **Sensitivity analysis.** This is the process of changing key variable in the analysis and determining the impact on results. This can be very important in determining whether a project, which is considered to be beneficial overall is of the optimal scope or in identifying what factors may affect a positive outcome (i.e., does a 10 percent difference in the population estimate make a large difference in the decision).
2. **Developing a range.** A potential range of results may be generated by developing plausible "worst case" and "best case" scenarios. In addition, rough probabilities may be associated with the outcomes.
3. **Decision analysis under uncertainty.** An explicit choice may be made to pursue an option that either maximizes the potential benefit or minimizes the potential for failure.
4. **Decision analysis under risk.** Probabilities may often be used to incorporate risk into an analysis.

The choice of technique and the level of precision in an analysis will depend on many factors including:

- The scope of the item analyzed;
- decision making needs;
- constraints (i.e. quality of data, time);
- data availability;
- the need to illustrate distributional impacts;
- the importance of consensus building and other qualitative considerations; and
- the level of risk or uncertainty associated with the outcomes.

For example, a much lower level of precision may be needed for a small request to fund the replacement of a copier than for a multi-year information technology project. Exhibit 7-3 presents a screening approach that departments can use to select the appropriate technique for an efficiency and effectiveness analysis. In this screening, more than one technique or set of techniques may apply to a single issue (i.e., the answer “YES” can be given for more than one question). It is also important to recognize that analysts can use many of these techniques in combination with one another.

Exhibit 7-3
Screen to Select the Appropriate Analytical Technique

Screening Questions	Level of Precision for Benefits Assessment	Suggested Techniques
Is the potential benefit of the project small relative to other requests (i.e., purchase of a copier)?	If YES, benefits should be assessed quantitatively, but with a relatively low level of precision.	<ul style="list-style-type: none"> • Cost-effectiveness Analysis • Switch-point Analysis
Do various constraints limit assessment (i.e., ongoing litigation prevents disclosure of information)?	If YES, benefits should be assessed qualitatively and the rationale for this decision should be clearly explained.	<ul style="list-style-type: none"> • Multi-criteria Analysis • Qualitative Benefit-Cost Analysis
Is there sufficient data to quantify the benefits (i.e., information system investment)?	If YES, benefits should be assessed quantitatively, and where feasible, monetized.	<ul style="list-style-type: none"> • Benefit-cost Analysis • Cost-effectiveness Analysis • Return on Investment Analysis • Switch-point Analysis
Is distribution of resources an important component of the project (i.e., assisted living support for the elderly)?	If YES, benefits should be assessed for different individuals served and compared.	<ul style="list-style-type: none"> • Cost-effectiveness Analysis • Multi-criteria Analysis
Is consensus-building an important component of the project (i.e., proposal generated through an interim committee or working with local governments)?	If YES, political and institutional issues should be assessed	<ul style="list-style-type: none"> • Multi-criteria Analysis
Is uncertainty or risk an important component of the request (i.e., does it involve a relatively long time horizon)?	If YES, sensitivity and uncertainty should be examined qualitatively or quantitatively.	<ul style="list-style-type: none"> • Sensitivity Analysis • Risk Analysis

7.7 ASSESSMENT OF ALTERNATIVES

This element of the analysis includes an assessment of the tradeoffs associated with available alternatives and is the key section for justifying the request. This element includes five components: background information; linkage of budgetary expenditures to the range of outcomes; application of the analytical technique/assumptions and calculations; key issues of decision making; and omissions, biases, and uncertainties.

The required components for evaluating each alternative are described below. Some or all of these components may be the same for each alternative. If this is the case, the component(s) only need to be listed once. Avoid repetition of information.

Background Information

In the first part of the assessment, provide background information related to the request. The purpose of this section is to provide context for understanding the analysis that will follow. In this section, it is not necessary to include facts or statistics that are part of the analytical justification for the request.

Linkage of Budgetary Expenditures to the Full Range of Outcomes

This component consists of a qualitative description explaining how budgetary expenditures link to the full range of outcomes. This should be a narrative section that focuses on illustrating in general terms the types of costs and benefits associated with the request. The analytical comparison of costs to benefits and the assumptions and calculations supporting the analysis should be presented in the next section.

This component should be used to describe the chain of events that occurs before the outcome is realized. For example, it is relatively straightforward to identify benefits to the State or to the immediate population served by a request. However, other costs and benefits should be considered. For example, an analysis of water quality controls should include the costs of regulation on private industry, and an analysis of child care grants should include the potential for improved employment opportunities for individuals receiving services for their children.

The format for this section is flexible. Budget and program staff can use the following checklist to assist them in applying a systematic approach to identifying outcomes:

- Budgetary expenditure – a description of how the requested funds will be used;
- external costs – the costs to other government entities, private industry, or citizens;
- internal benefits – budgetary savings, future costs avoided, as well as more general “process” benefits that result from improvements such as increased certainty, clarity, or shared understanding; and
- external benefits – positive social, economic, or environmental impacts, as well as process benefits to the clients or public, rather than internal to the department.

Application of the Analytical Technique/Assumptions and Calculations

This component of the analysis provides the detailed justification for the request and includes (1) a comparison of benefits to costs using an analytical technique, (2) budgetary cost assumptions and calculations, and (3) benefits assumptions and calculations. The comparison of benefits to costs provides the conclusions of the analysis. The assumptions and calculations provide the details of the analysis.

Comparison of Benefits to Costs Using an Analytical Technique

This component presents of the conclusions of the analysis as a comparison of benefits to costs. The format for this component will vary depending on the analytical technique that is applied (see Appendix K). For example, this section may include an estimate of the effectiveness of each alternative per dollar spent or a matrix summarizing the detailed justification behind a multi-criteria analysis. Each of the analytical techniques addressed in Section 7.6 involves comparing a specific estimate of budgetary costs to an estimate of the potential benefits.

Budgetary Cost Assumptions and Calculations

This component should enumerate the assumptions and calculations used to develop an estimate of the budgetary costs associated with an alternative and should be presented in a table or spreadsheet. Some points to consider when documenting assumptions and calculations for costs are:

- The budgetary cost estimate should track to the amount on the Schedule 6.
- Calculations should be presented at the greatest level of detail possible. A reader should be able to duplicate the calculations. If the calculations are complicated, use Excel to perform them and include the Excel spreadsheet with your request.
- Document rate calculations and other mathematical formulas.
- Document the basis for using a particular estimate, the source of data, and all other assumptions.
- Identify the fund sources supporting the cost estimate, including the title of cash, cash exempt, and federal sources. As necessary, explain why specific fund sources are used to support various components of the request.
- If the request generates budgetary savings in the request year, these savings should offset the estimated cost of the request.
- If the cost is short-term, rather than ongoing, or if the cost is estimated to increase or decrease after the second year, the relevant out-year costs should be provided. FTE annualization, elimination of capital outlay costs, and cost increases attributable to contractual obligations are among the items that should be addressed in the out year. Provide relevant assumptions and detailed calculations for out-year costs, including the costs broken out by year and by component.
- If the request is for a multi-year project, the same format should be used from year to year and all previous and future years of funding related to the project should be shown. If cost estimates differ from those shown in previous year budget requests, an explanation should be provided.

- Each change request should include a section that discusses the department's plan for implementing the requested alternative. Implementation schedules may differ for each request. Therefore, no specific format is required. However, the implementation schedule should identify the phases of implementation (if applicable), the components and associated costs of each phase and a time line for completion of each phase. Overall, this section of the assumptions and calculations should provide detailed information about when and how the requested alternative will be implemented.
- Information technology requests costs should adhere to Office of Innovation and Technology guidelines. See Chapter 9 for detailed instructions.

Common operating cost assumptions, which should be used for change and base budget requests, will be included with the common policy instructions.

Common personal services assumptions, which should be used for change requests, are shown in Exhibit 7-4.

Exhibit 7-4
Common Personal Services Assumptions

Category	Assumption
Personal Services Detail	Identify position classification, FTE, salaries, and allowable central appropriations (see below).
Job Classification	All new positions must be requested at the minimum salary for the job classification.
Central Appropriations for Requests of Less than 20.0 FTE	Only PERA, AED (Amortization Equalization Disbursement) and Medicare costs should be included.
Central Appropriations for Requests of 20.0 FTE or More	Include PERA, AED, Medicare, short-term disability, and health, life and dental costs.
Leased Space	Leased space may only be requested for requests of 20.0 FTE or more.

Benefits Assumptions and Calculations

This section should enumerate the assumptions and calculations used to develop an estimate of the benefits associated with an alternative. For example, in a cost-effectiveness analysis, the benefits are presented as a quantified estimate of effectiveness that can be achieved for a specified cost. In a multi-criteria analysis, the justification for ranking one alternative higher than another must be provided in the greatest detail possible. This section may need to include a spreadsheet outlining assumptions and calculations, as well as other tables and narrative. Some points to consider when documenting assumptions and calculations for benefits are:

- Calculations should be presented at the greatest level of detail possible. A reader should be able to duplicate the calculations.
- Benefits should be quantified or monetized if possible. Potential benefits may include future cost savings (i.e., anticipated budget reductions), future costs avoided (i.e., avoided or smaller future budget requests), or improved or additional services.

- Document rate calculations and other mathematical formulas.
- Document the basis for using a particular estimate, the source of data, and all other assumptions.
- The same format should be used from year to year. If benefits estimates differ from those shown in previous year budget requests, an explanation should be provided.
- The benefits discussion should only address the incremental benefits. This involves careful definition of the appropriate baseline for comparison. For example, the benefits of an education program should be estimated based on the anticipated size of the population in the first full year the new service is available, not in the current year.
- It is important to clearly identify whether the benefit estimate represents annual or total of multi-year benefits. If out-year benefits are expected to change significantly, it may be useful to show how benefits are anticipated to change over time (this can be done qualitatively or quantitatively).
- Finally, it is necessary to appropriately attribute benefits to the specific budgetary expenditure being requested. This requires the department to separate the positive impacts caused by the expenditure from those caused by other policy or socioeconomic changes. This should be done qualitatively and quantitatively, to the extent possible.

Key Issues for Decision Making

A wide range of information besides an assessment of costs and benefits is often needed to frame the context for a decision and it is important to include this information as part of the analysis. This component of the analysis should provide the additional information that is needed to evaluate a request. Exhibit 7-5 provides a suggested list of questions that may be relevant to an efficiency and effectiveness analysis.

Exhibit 7-5
Suggested Questions to Address in Framing the Key Issues for Decision Making

Type of Request	Questions
Maintain same quantity and quality of service (i.e., change in match rate, rate increase, change in funding source)	<ul style="list-style-type: none"> • Is the service still a priority? • How has the state cost for service changed over time?
Increase quantity of service (i.e., caseload increase)	<ul style="list-style-type: none"> • Scope of service provided? • Scope of need? • How has the proportion of the served population changed relative to the overall population?
Improve efficiency of service (i.e., automation, reorganization)	<ul style="list-style-type: none"> • How will quality be maintained? • How will costs avoided be tracked and demonstrated?
Increase quality and/or quantity of service (i.e., new program, extend service to new population)	<ul style="list-style-type: none"> • How does this service relate to ongoing programs? • Could this service be consolidated with another program? • Could private or local government resources be leveraged?
Change in Long Bill format to improve management	<ul style="list-style-type: none"> • How will increased or decreased flexibility affect management? • How will efficiency in operation increase? • Will budget actions be reduced?

Omissions, Biases, or Uncertainties

This component should consist of an assessment of the potential direction or magnitude of the omissions, biases, or uncertainties associated with the analysis. Any issues, which could change the conclusion of the analysis, should be clearly explained.

7.8 PARTIAL ANALYSIS

This section describes criteria for identifying exceptions to the full requirements for efficiency and effectiveness analysis. In all cases, departments are required to obtain OSPB approval before developing a partial analysis. The ultimate decision about the appropriate level of analysis for a request is at the discretion of the OSPB, and may vary from the guidelines presented in this section.

The OSPB will use five general criteria to determine whether a partial analysis will be acceptable for a change request:

- technical corrections;
- new data on available cash or federal funding that would be used for an ongoing purpose and that would result in a revision to an estimated appropriation;
- FTE or funding *reductions* that result from management changes that will have no effect on the level of service provision;
- refinancing that will allow the department to use more federal, local, or private funds while maintaining the same level of service; and
- transfers which result in a net zero change in both the appropriation total and the appropriation by fund source.

Partial analyses will at a minimum require the first element of an efficiency and effectiveness analysis – common identifying information/summary of the request, and in most cases, assumptions and calculations will also be required. Other information may also be required. For example, a transfer request would require documentation on the factors driving the funding shortfall, an explanation of why additional funds are available in another line item, and a discussion of implications for future funding of the affected lines. Another example of an appropriate use of partial analysis is a budget amendment to correct a technical error in the November 15 request. This type of technical budget amendment will require a summary of the request, an explanation of the change, a revised assumptions and calculations that clearly delineate how the numbers have changed, and an explanation of why the request was not submitted with the November 15 request.